had received his therapy I too could say it did wonders for me, but I used a less painful and probably much less expensive method—nothing.

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Sensitivity to Contact Lens Solutions

TO THE EDITOR: Many patients with allergic rhinoconjunctivitis are unable to wear contact lenses. This problem is frequently assumed to be due to an aggravation of their allergic problem. A case of thimerosal sensitivity is presented, which may indicate the possibility that a sensitivity to thimerosal and a contact dermatitis should be considered in allergic patients unable to wear contact lenses.

Report of a Case

A 37-year-old woman had had hay fever, urticaria and recurrent otitis media as a child. Aspirin sensitivity with generalized angioedema first developed when she was 19. Asthma was first noted at age 21 and development of nasal polyposis at age 32.

A full allergy evaluation was done at age 32. It showed a large number of very small reactions to the airborne allergens. No environmental allergies were identified. She was treated symptomatically with oral bronchodilators, nasal beclomethasone dipropionate spray and antibiotic therapy when needed for acute sinus infections.

The patient presented at age 36 with inability to wear contact lenses because of severe eye itching and inflammation. She tried both the hard and soft contact lenses without success. Although she experienced minimal eye discomfort when wearing regular glasses, a severe itchy, painful conjunctivitis would occur within two to three hours of wearing her contact lenses. Because of the pronounced exacerbation of her very mild conjunctivitis, the patient was patch tested for thimerosal and ethylenediamine. She had a notably positive reaction to thimerosal at 24 and 48 hours, with negative reactions to both control and ethylenediamine. The patient changed from her wetting solution containing thimerosal to one that contained a different preservative. She subsequently has been able to wear her contact lenses for long periods with no eye irritation.

Discussion

Inability to wear contact lenses is a frequent complaint encountered in an allergist's office and is often assumed to be related to the patient's allergies. A recent check of available wetting solutions showed most solutions contained thimerosal.

Thimerosal (Merthiolate) is an organic mercurial that is used both as a preservative and a bacteriostatic agent. It is poorly absorbed and tends to fix to the tissues.[1] Patients can have hypersensitivity reactions to either the mercurial or the thiosalicylate portion of the thimerosal molecule.[2] Tincture of Merthiolate (Lilly) also contains ethylenediamine and a number of azo dyes, all of which can be sensitizing agents.[3]

Discussion with several ophthalmologists indicates that in approximately 10% of their patients fitted with contact lenses, some intolerance to the wetting agent developed. This would be in agreement with a study that showed a high incidence of patch-test-positive reactions to Merthiolate in adults with no previous or current skin disease.[4] This case seemingly indicates that wetting solution sensitivity should be considered in allergic patients who are unable to wear contact lenses due to eye irritation.

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Have You Hugged Your Colon and Rectal Surgeon Lately?

TO THE EDITOR: A doctors' parking lot may seem an unlikely place for serious humor, but clearly it has its funny side. Consider the title of this letter for instance—a question seen recently on a bumper sticker in the lot. Or license plate tags like SYNAPSE and WHEEZE. Or PQRSTU. Yes, PQRSTU, in the middle of the alphabet. Not until its electrocardiographer author emerged did this little riddle reveal its secret.

These comic license tags give specialists identity and since we all strive for some uniqueness, we enjoy the playful touch of ego. But let's go back to the bumper sticker, for it carries an illustration of the use of humor in medical practice. While the license tags tickle our fancy, the anal/hug humor penetrates to a deeper level, even to a glimpse of serious insights. In this sense, humor and laughter can serve as powerful therapeutic adjuvants.

Hug your proctologist? In this image suggesting filth, stench, pain and mortification, we are to embrace, to hug? It is laughable. Fortunately that is what we do, that is how we handle it; we laugh at our painful predicament—together. It is therapeutic to know that—to know that we are all in this together. The laugh signals recognition of our mutual plight, for we all have animal bodies with anuses and we're stuck with them. We have to accept the givens of these biological necessities.

But the funny thing is that the comic line also tells us to test the limits of our possibilities, our hugs—even to the unlimited possibilities of love. Humor juxtaposes the necessities with the possibilities. It acknowledges our limits but encourages us to test them. So in medicine it encourages healing.

To come at this with a metaphor from an adjacent specialty, physicians serve as midwives helping people get their spirits reborn. Our very presence as medical professionals continually reminds our patients of their inescapable, unsightly and unseemly bodily functions and dysfunctions. Our role is to help them accept and see beyond these limiting necessities to the possibilities that illness has temporarily obscured. Gentle humor can help bridge this gap. A physician using humor wisely shows both an awareness of the dual nature of humankind and a willingness to communicate in the nonscientific language of inference, symbolism and spirit. Frequently, a physician and patient can use this alternate path in addition to the hard, cold scientific facts and get a better sense of each other and of the problems and possibilities at hand. And, they can enjoy a lot of therapeutic laughter.

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The Effect of Heparin Dilution on Arterial Blood Gas Analysis

To THE EDITOR: Twenty years after Anderson[1] presented his findings on sampling and storing blood, confusion remains regarding the effects of heparin dilution on the accuracy of blood gas determinations. A commonly used text on blood gas analysis states that "if too much sodium heparin is used, it will affect the results to the acidotic side."[2] This concept is quite pervasive within medical teaching. Some studies state that excessive heparin affects the pH only minimally while arterial oxygen pressure ($Pa{O_2}$) and carbon dioxide pressure ($Pa{CO_2}$) may be altered more significantly[1,3]; however, the mechanism of these changes is not addressed. Clearly, there is not a wide clinical understanding of the effects of heparin overdilution on arterial blood gas measurements.

To determine what changes occur when blood is diluted with heparin or 0.9% sodium chloride solution (NS) and analyzed in the usual clinical manner we performed the following study.

Materials and Methods

Heparin sodium (1,000 United States Pharmacopeia units per ml) was added to glass syringes in volumes of 0.125, 0.25, 0.5 and 1.0 ml. Arterial blood was drawn from a patient into the syringes to a total volume of 2.0 ml. The syringes were gently rolled and tilted manually to assure mixing, and analysis of pH, $Pa{O_2}$ and $Pa{CO_2}$ was done immediately on a calibrated Radiometer ABL-2 automated blood gas analyzer. The study was repeated with arterial blood from a second patient using syringes containing only enough heparin sodium to fill the needle and hub and using NS in the same concentrations as previously used with heparin.

Results and Discussion

The results are summarized in Table 1. Upon dilution with both heparin and NS, the pH remains unchanged even in dilutions of 50%. The $Pa{CO_2}$, however, falls dramatically while the $Pa{O_2}$ rises.

In our practice, we often observe confusion on the part of staff physicians, house officers, nurses and respiratory therapists regarding the effects of heparin dilution on arterial blood gas analysis. Most believe excessive heparin will cause the pH to fall significantly but are puzzled by the possibility of an effect on $Pa{O_2}$ or $Pa{CO_2}$.

TABLE 1.—*The pH, Arterial Oxygen Pressure ($Pa{O_2}$) and Arterial Carbon Dioxide Pressure ($Pa{CO_2}$) of Arterial Blood Diluted With Heparin Sodium or 0.9% Sodium Chloride Solution (NS)*

Solution	*pH*	$Pa{O_2}$ *mmHg*	$Pa{CO_2}$ *mmHg*
Heparin Sodium	6.393	134.6	7.6
0.9% Sodium Chloride	5.900	161.4	9.4
	Percent of Initial Value		
Heparin Dilution			
6% Heparin	100	99	95
12% Heparin	100	105	92
25% Heparin	100	111	65*
50% Heparin	100	130*	38*
NS Dilution			
6% NS	100	100	98
12% NS	100	100	91
25% NS	100	105	70*
50% NS	100	112	49*

*$P<.05$.

The changes we demonstrate follow well-established principles of physics and physiology.[4] The pH, for practical purposes, remains unchanged because of the vast buffering potential of oxyhemoglobin and plasma proteins; for example, for a hemoglobin concentration of 15 grams per dl, 1.62×10^7 nm of hydrogen are required to lower the pH from 7.40 to 7.15. The hydrogen ion concentration of the heparin used in this study was 4.00×10^2 nm per liter. Hence, it would take an enormous disproportion of heparin to significantly afect the pH, much more than even a gross clinical error.

Of more practical significance, however, are the dilutional effects on $Pa{O_2}$ and $Pa{CO_2}$. The effect on $Pa{CO_2}$ may be of clinical significance at dilutions of 25% or greater. The effect on $Pa{O_2}$ is less striking. These dilutional changes are understandable if one considers that the partial pressure of a gas in solution is proportional to the solubility coefficient of the gas and the partial pressure of the gas overlying the liquid. The $Pa{O_2}$ and $Pa{CO_2}$ of heparin or NS reflect the air/fluid boundary in the storage bottle. Hence, in obtaining an arterial blood sample one is mixing heparin with a relatively high $Pa{O_2}$ and low $Pa{CO_2}$ with arterial blood. As would be expected, the $Pa{O_2}$ rises while the $Pa{CO_2}$ drops sharply, both changes in proportion to the relative differences in partial pressure of these gases between blood and heparin.

In summary, when excessive quantities of heparin are added to blood, the primary effect on blood gas analysis is dilutional, and $Pa{CO_2}$ is the measurement most profoundly affected. This change in $Pa{CO_2}$ could lead to a misinterpretation of a patient's acid-base status. Additionally, it is conceivable that the rise in $Pa{O_2}$ might lead to an erroneous conclusion regarding a patient's need for supplemental oxygen. Finally, for